

**CORRECTED EXHIBIT 2 – LIST OF PRIOR ART REFERENCES
AND KEY TO GROUPS OF PRIOR ART REFERENCE CITATIONS FOR
COMPOSITE INVALIDITY CHARTS UNDER JAY’S CONSTRUCTION**

LIST OF PRIOR ART REFERENCES

1. C.A. Schroeter, et al, *Hair Removal in 40 Hirsute Women with an Intense Laser-Like Light Source*, 9 Eur. J. Dermatol. 374 (Jul.-Aug. 1999)
 - A. P. 1: “In this study we described the removal of hair without side effects by means of non-laser incoherent emitted light, produced by the ILS flashlamp. ... In general 76.7% of the hair was removed within 6 treatments”
 - B. P. 2: “It is necessary that the laser beam penetrates deep into the dermis in order to reach the hair follicles and to be selectively absorbed by melanin.”
 - C. P. 3: “They were asked to shave 3-4 days before treatment.”
 - D. P. 4: “Hair shafts showed fragmentation. No focal ruptures of the follicles ... was found.”
 - E. P. 4: “a pulse duration of approx.. 5-6 msec, a wavelength of 590 nm for dark hairs, 550 nm for blond hair, and a fluence between 35-40 J/cm². Later on, the treatment was changed to double pulses as pulse modes, with 5 msec per pulse duration and fluences between 35-40 J/cm².”
 - F. P. 4: “At the Medical Centre Maastricht the treatment intervals were as follows:

6 weeks after the first treatment, 8 weeks after the second treatment, 3 months after the third treatment, and 3-4 months after the fourth treatment.

Depending on the skin type, delays were chosen to cool the epidermis in between the pulses, e.g. for skin type 1 and 2 a delay of 10-20 msec was chosen, with a double pulse as pulse mode, for skin type 3 a delay of 30 msec was chosen, and if treating skin type 4, a delay of > 50 msec was used.”
 - G. P. 4: “Most of the time about 20% of hair disappeared after the first treatment in dark-haired individuals. Depending on the hair cycles, growth of new hair was observed.”
 - H. P. 5: “the shorter the treatment interval, the greater the hair removal reduction.”
 - I. P. 5: “Depending on the structure of the hair and the content of pigment, a choice of variable energy has to be made to destroy the follicle.”

2. Hair Removal Using Optical Pulses, U. S. Patent No. 5,735,844 (filed Jan. 30, 1996) (issued Apr. 7, 1998)

- A. Col. 3: 8-16: "... where only temporary hair removal is desired, this may be accomplished for a period of up to several weeks, ... Low level irradiation applied through the applicator to the skin region will then result in the destruction of the hair without destroying the follicle."
- B. Col. 20: 4-8: "... applying optical radiation of a selected wavelength and of a selected fluence through said element to said skin region to simultaneously remove a plurality of hairs from said region, said applying step lasting for a duration of from 2 to 100 ms."
- C. Col. 3: 1-4: "To facilitate hair removal, hairs in the skin region may be shaved prior to irradiation."
- D. Col. 2: 10-14: "... the technique involves placing an applicator in contact with the skin surface in the skin region and applying optical radiation of a selected wavelength and of a selected flux through the applicator to the skin region for a predetermined time interval."
- E. Col. 15: 18-21: "It may also be possible to utilize the teachings of this invention for short term hair removal, the device service as for example a razor which might provide a shave lasting for perhaps one to two weeks."
- F. Col. 8: 20-26: "In particular, properties which affect the hair-removal process include the pulse energy, pulse duration, repetition rate (i.e., the time duration between subsequent pulses), wavelength, energy, exposure spot size, beam convergence as it enters the skin, and mode geometry (i.e., spatial extent and uniformity) of the optical pulse. ... Referring now to FIG. 4, the wavelength of the irradiating field is chosen to be resonant with the natural pigment (i.e., melanin) present in the target sites (i.e., the hair shaft, bulge, matrix, and papilla)."
- G. Col. 5: 6-11: "It is preferred, for example, to deliver sufficient optical energy to several "target" regions on the hair follicle; radiation delivered to these regions results in complete and localized destruction of the follicles. ... Prior to treatment, the region to be treated may be shaved in order to facilitate irradiation of the follicles."

3. Christine C. Dierickx, M.D., *Hair Removal by Lasers and Intense Pulsed Light Sources*, 20 Dermatol. Clinics 135 (Jan. 2002)

- A. P. 139: "Laser treatment usually produces complete but temporary hair loss for 1

to 3 months, followed by partial but permanent hair loss.”

- B. P. 139: “Hair regrowth was delayed for 1 to 3 months in all subjects at all fluences at both shaved and wax-epilated sites.”
- C. P. 139: “... thirteen patients with fair skin and dark hair were treated once on the thighs or back at fluences of 20 size of 6mm”
- D. P. 139: “... vaporization of the hair shafts, ...”
- E. P. 135: “Endogenous Chromophore In the visible to near-infrared region, melanin is the natural chromophore for targeting hair follicles.”
- F. P. 140: ” ... hair counts are reduced by approximately 30% after a single treatment with the ruby laser.”
- G. P. 141: “Although capable of inducing delayed regrowth, these systems are ineffective at producing long-term hair removal.”
- H. P. 141: “A single or multiple (two- to five) pulse made with various pulse delay intervals can be chosen. Fluences with this system range between 0 and 65 J/cm², ...”
- I. P. 142: “... the delay in regrowth is similar to that achieved with lasers.”
- J. P. 142: “Research has shown greater hair loss at shaved than at epilated sites, suggesting that light absorption by the pigmented hair shaft itself is important.”
- K. P. 142: “The patient should to shave the area to be treated.”
- L. P. 142: “The ideal treatment parameters for laser-assisted hair removal must be individualized for each patent.”
- M. P. 143: “The damaged hair is often shed during the first weeks after treatment, and patients should be reassured that this is not a sign of hair regrowth. Laser hair removal requires the presence of a pigmented hair shaft. Retreatment can therefore be performed as soon as regrowth appears. Regrowth is based on the natural hair cycle, which varies by anatomic location, on average, the timing is 6 to 8 weeks.”
- N. P. 144: “Each patient may have different expectations of treatment (e.g., temporary versus permanent and partial versus complete hair removal). ... Growth delay that provides a few months of hairless skin is far All laser systems have been shown to reduce hair growth temporarily Blonde, red, or gray-haired patents are unlikely to experience a permanent reduction, but hair loss in these patients can be maintained by treatment at approximately 1 to 3 month intervals.”

- O. P. 144: “Long-term, controlled hair counts indicate an average of 20% to 30% hair loss with each treatment, so multiple treatments are needed to obtain complete hair removal.”
- P. P. 137: “Initially, photomechanical destruction of hair was attempted ...”
- Q. P. 137: “ ... produces hair follicle destruction ...”

4. Agneta Troilius & Carl Troilius, *Hair Removal with a Second Generation Broad Spectrum Intense Pulsed Light Source – a Long-Term Follow-Up*, 1 J. Cutaneous Laser Therapy 173 (1999)

- A. P. 173: “... permanent hair removal has been difficult to claim due to the long growth/rest cycle of normal human hair follicles.”
- B. P. 173: “Ten females (20 bikini lines) with dark hair and skin types II-IV were treated with an IPL (600 nm) four times with a 1-month interval, ...”
- C. P. 173: “Hair reduction of 74.7% (SD \pm 189.3%) was seen 4 months after the treatments and 80.2% (SD \pm 20.3%) 8 months after the last treatment. ”
- D. P. 173: “Long-term or permanent hair reduction is based on thermal damage to the hair follicle obtained by absorption of optical energy in the hair”
- E. P. 174: “Treatment with different lasers, for example ruby, ... as well as broadband light, have proved to delay hair growth significantly. ”
- F. P. 174: “Prior to the treatment, the groin area was photographed and shaved.”
- G. P. 174: “The test areas were treated in one pass with an overlapping of 10%.”
- H. P. 174: “Four treatments were performed on each volunteer on both sides of the bikini areas with intervals of 4-5 weeks.”
- I. P. 174: “The IPL can be adjusted to a pulse duration up to 50 ms. For all volunteers, a pulse duration of 44.5 ms was chosen. The pulses were composed of an undulating train of four individual pulses of 10 ms spaced by 1.5-ms intervals. The fluences used were a mean of 18.3 (SD \pm 3.3)”
- J. P. 177: “Due to unsynchronized cyclic growth, not all hair follicles will be in anagen phase at the time of the treatment. More treatments will therefore always be required in the same area to ensure treatment of all follicles while in anagen phase. Maybe the best treatment interval should be when a certain amount of the hair has come back instead of having fixed intervals.”
- K. P. 177: “In clinical practice, pulse width and fluence should be adjusted according

to skin type and pigmentation.”

5. Method and Apparatus for Hair Removal, U.S. Patent No. 5,630,811 (filed Mar. 25, 1996) (issued May 20, 1997)

A. Abstract: “A laser treatment method for removing unwanted human hair includes irradiating a treatment site with post-coherent light of selected wavelength and peak power level and post duration, and repeating the post-coherent laser irradiation on one or more subsequent occasions with selected light parameters.”

B. Col. 3: 56-66: “The present invention comprises a laser treatment method and apparatus for the removal of unwanted hair.

The treatment method, according to one embodiment of the invention, includes:

Irradiation of the skin uniformly with peak power level in the range of 1-500 Watts of coherent light, pulsewidth 1-99 milliseconds, spot size 1-3 mm, and wavelength in the range of 650-1000 nm, controlling the parameters until desired endpoints are observed during treatment, consisting of ‘curling’ or residual hair,”

C. Col. 4: 1-3: “Allowing the skin to heal for a period of 1-3 months, Irradiating on 0-8 subsequent occasions with additional exposures.”

D. Col. 4: 13-15: “The specific target for the laser radiation is the melanin within the hair shaft and within the melanocytes lining the follicular duct.”

E. Col. “11: 9-11: “1. The present methodology envisages the use of a specific parameter set chosen to provide optimum selectivity of damage to the target tissue only.”

F. Col. 11: 34-36: “6. Several treatments are required. Each treatment will provide an occasion for the physician to tailor the parameters to the individual needs of the patient.”

G. Col. 11: 5-8: “Exposed hair is shaved.

On the first treatment visit, individual portions of the site to be treated are designated as test sites to which different carefully chosen parameters of laser light are applied. An initial set of parameters would typically be: 30 Watts of light, 2 mm spot size, 1 millisecond exposure time.”

H. Col. 11: 19-20: “Desired response includes a ‘curling of any remaining hair about the skin.””

I. Col. 11: 27-31: “The patient will return after a specified healing period (usually 1-

3 months) for evaluation and further treatment. These additional treatments (typically up to 7) are administered with the parameters found to result in minimal regrowth with minimal adverse sequallae.”

- J. Col. 2: 38-39: “laser pulses are applied to the skin in the absence of an externally applied chromophore.”

6. **Gregory Altshuler, PhD, *The Palomar EsteLux™ Pulsed-Light System: A New Generation Hair Growth Management System with an Excellent Balance of Safety, Speed, and Performance* (Palomar Med. Techs. 2001)**

- A. P. 1: “... a new technology of hair removal using light to target chromophores (pigment) naturally found in human hair.”

- B. P. 1: “On average, after one treatment growth delay is between 1 and 3 months, and permanent hair loss ranges from 0 to 40%. Complete hair clearance usually requires 3 to 10 treatments with 1-2 month intervals between treatments.”

- C. P. 2: “*Hair Growth Management*”

This includes several effects: a delay in hair growth, a slowing down of the growth rate, ... has been demonstrated that all these effects can be achieved by light. The average growth delay is equal to about half of the hair growth cycle (see table 1) and requires minimal light energy. Higher light energies have to be employed for changing the hair growth rate, “

- D. P. 2: “Hair growth is arrested and excess hair is shed.

As a result of the treatment, hair growth is delayed by a time equal to approximately half of the hair growth cycle.”

- E. P. 2: “A light pulse penetrates into the skin, is absorb by the hair matrix and hair shaft, and heats them up.”

- F. P. 3: “Light is emitted within a wide spectrum, which includes green, yellow, red, and near infrared wavelengths. The spectrum was optimized to maximize light absorption in the hair matrix and hair shaft,”

- G. P. 3: “The EsteLux has nine preset fluence/pulsewidth combinations that can be selected by pressing a button on the front panel.”

- H. P. 3: “The “photowaxing” mode has a 10 ms pulsewidth and three fluence settings: 6, 7 and 8 J/cm². These fluence levels are very safe for most skin types and produce thermal damage of the hair matrix and a hair growth delay up to the length of the hair growth cycle (duration of anagen and Telogen phases, see Table 1).”

- I. P. 5: “The test sites were shaved before treatment.”
- J. P. 5: “For all presets, a significant growth delay from 2 to 12 weeks has been observed, exact duration of the delay depending on subjects and anatomical sites.”

7. **Christine C. Dierickx, M.D., *Laser Hair Removal: Scientific Principles and Practical Aspects* (Lumenis Inc. 2002)**

- A. P. 1: “The use of lasers for hair removal has been studied for a number of years. In this procedure, laser light is absorbed by melanin in the hair shaft, damaging the follicular epithelium.”
- B. P. 1: “Of 92 patients, all had temporary hair loss ...”
- C. P. 1: “Laser hair removal focuses on the endogenous chromophore melanin, which is mainly found in the hair shaft.”
- D. P. 1: “When an appropriate energy source (such as a laser) is directed at the skin, light is primarily absorbed in the hair shaft melanin.”
- E. P. 1: “Laser hair removal targets the melanin in the hair shaft.”
- F. P. 3: “The study showed that the high-power diode laser induces two separate effects: temporary hair loss and permanent hair reduction.

Temporary hair loss occurs in all patients, for all hair colors and at all laser fluences. It usually lasts from one to three months.”
- G. P. 4: “There is a difference between permanent hair reduction and complete hair loss. Complete hair loss implies that there are no regrowing hairs. This can be a temporary or permanent phenomenon. The LightSheer Diode Laser usually produces complete but temporary hair loss, followed by a partial but permanent hair reduction.”

H. P. 5:

Laser Wavelength	800 nm
Pulse Duration	5 to 100 milliseconds
Spot Size	9 by 9 millimeters*
Fluence	10 to 40 Joules/ cm ²
Repetition Rate	1 pulse per second*

Table II. LightSheer Diode Laser characteristics

*Other LightSheer models have expanded capabilities for these specifications.

- I. P. 6: “It is important to shave before beginning the treatment. If the external hair shaft is present the laser will burn it, in turn burning the skin.”
- J. P. 6: “When the hair shaft carbonizes, it leaves debris on the sapphire window.”
- K. P. 7: “Several pulses should then be placed next to one another while looking for the epidermal response.”
- L. P. 7: “An effective fluence is one where the hair carbonizes...”
- M. P. 7: “Additionally, within several days of treatment there is a phenomenon in which hair casts. Carbonized by the laser, will be shed from the hair follicle. Patients may believe that their hair is regrowing. These hair casts can be pulled out easily with tweezers.”
- N. P. 8: “Second treatments should be given when the hair begins to regrow. This will occur at different times for different anatomical areas. For the face, armpit, and bikini it is usually after one to two months.”
- O. P. 3: “Consequently, the laser source must have a range of pulse widths to selectively damage different size follicles.”

8. Christopher A. Nanni MD & Tina S. Alster MD, *Long-Pulsed Alexandrite Laser-Assisted Hair Removal at 5, 10, and 20 Millisecond Pulse Durations*, 24 Lasers in Surg. & Med. 332 (1999)

- A. P. 332: “Hair counts were reduced by 66% at 1 month, 27% at 3 months, and 4% at 6 months.”

- B. P. 332: "The removal of unwanted hair by using pulsed laser irradiation has revolutionized the hair removal industry, with over a dozen different laser systems and light sources currently available."
- C. P. 334: "Exposed hair shafts were completely vaporized upon laser impact with evidence of residual shaft remnants in the follicle."
- D. P. 334: "Laser-assisted hair removal using a long-pulsed 755 nm alexandrite laser is an effective and safe method to delay hair regrowth for up to 6 months. Significant hair removal and an equivalent delay in hair regrowth is observed when using either a 5, 10, or 20 ms pulse duration at an average fluence of 18 J/cm²."
- E. P. 337: "... multiple successive laser treatments are necessary in order to attain significant long-term epilation."

9. **Mark S. Nestor MD PhD, *Laser Hair Removal: Clinical Results and Practical Applications of Selective Photothermolysis, Skin & Aging* (Jan. 1998)**

- A. P. 37: "First, the single hairs were treated with fluences of approximately 25 joules per cm² and at eight months they showed less than 20 percent growth on those areas and those hairs specifically treated. With regard to the facial sites treated, one month after one treatment there was a 55 percent growth, one month after a second treatment there was 40 percent growth, one month after a third treatment there was only 25 percent growth and finally after the fourth and fifth treatments over seven months, 12 months thereafter there was a 10 percent average growth."
- B. P. 38: "Overall, these results indicated that multiple treatments were needed to achieve significant long-term hair removal with a maximum amount of reduction."
- C. P. 39: "Overall, our best results appear to be in patients who have had four to eight treatment cycles over twelve months with intervals depending upon the location of the hair. Specifically, we treat patients for virtually complete removal using two treatments over the first two to eight weeks followed by treatment when significant amounts of hairs are growing. In this way, we are treating hairs just as they enter anagen phase."
- D. P. 40: "As noted, the treatment numbers and intervals are highly dependent upon the site."
- E. P. 40: "Patients will tell you that they notice a decrease in the coarseness of remaining hairs as the treatment progresses."

10. Christine C. Dierickx, MD et al, *Permanent Hair Removal by Normal-Mode Ruby Laser*, 134 Arch Dermatol. 837 (July 1998)

- A. P. 841: "Presence of the hair shaft during laser exposure was not essential to induce growth delay, which occurred at all fluences in both shaved and epilated sites in all participants. Presumably, there is enough ample melanin present because epilation typically breaks the hair shaft above, in the upper third of, or at the midlevel of the bulb."
- B. P. 841: "Growth delay that provides a few months of hairless skin is far more reliable and requires lower fluences than permanent hair loss."
- C. P. 841: "complete hair loss may be either temporary or permanent. Ruby laser treatment usually produces complete hair loss for 1 to 3 months, followed by partial permanent hair loss."
- D. P. 841: "As the "surviving" terminal follicles transition into anagen, after growth delay, a second treatment may be more effective than the first. On the contrary, a second treatment given too early or too late may have little effect."

11. Ronald G. Wheeland, MD, *Laser-Assisted Hair Removal*, 15 Dermatol. Clinics 469 (July 1997)

- A. P. 474: "Initial results from the Nd:YAG study have demonstrated that this procedure does produce a perceptible subjective and objective temporary reduction in hair density; it does not appear to be permanent."
- B. P. 474: "The effectiveness of staged multiple retreatments to provide longer periods of growth delays or permanent hair removal is currently under investigation."
- C. P. 476: "It is possible using current laser technology to permanently remove some hair and induce a prolonged delay in the regrowth of many hairs."

12. Grossman, et al., *Damage to Hair Follicles by Normal-Mode Ruby Laser Pulses*, 35 J. Am. Acad. Dermatol. 889 (Dec. 1996)

- A. P. 889: "Damage to hair follicles by normal-mode ruby laser pulses" suggests repeat treatments"
- B. P. 889: "At 6 months, four subjects had less than 50% regrowth, ..."
- C. P. 894: "... this suggests that multiple treatments given at intervals consistent with follicular cycling would be more effective."

13. Tina S. Alster, MD, *What Factors Really Matter in Laser Hair Removal?*, Skin & Aging (July 1999)

- A. P. 15: “... treatment of the upper lip, chin and back often requires more treatment sessions to achieve the desired degree of hair loss.”
- B. P. 15: “Older surgical protocols called for an initial treatment to achieve as much follicular destruction as possible, followed by a retreatment two to four weeks later, when the remaining follicles would be in early anagen phase.”
- C. P. 16: “Table 1. Laser Systems for Hair Removal”

14. Neil S. Sadick, MD, et al., *Long-term Photoepilation Using a Broad-spectrum Intense Pulsed Light Source*, 136 Arch Dermatol. 1336 (Nov. 2000)

- A. P. 1336: “The mean hair removal efficiency achieved was 76% after a mean of 3.7 treatments.”
- B. P. 1337: “All patients received 3 monthly treatments, and 13 had subsequent treatments as necessitated for further clinical improvement and/or because of partial regrowth of hair. Further treatments were administered at intervals of 1 month or more.”
- C. P. 1337:

Table 1. Photoepilation Protocol for Long-term Study

Fitzpatrick Skin Type	Filter, nm (Long-Pass)	Fluence, J/cm²	Pulse Duration, ms	No. of Pulses	Pulse Delay, ms
II	615	39-42	3.3	2.	30
III	645	34-36	3.0	3	30
IV	645	34-40	3.0	3	40
V	695	38-40	2.6	3	30

- D. P. 1338: “First, heat–induced destruction of the hair shaft without germinative area damage may lead to hair “drop-out,” ie, the hair shaft falls out and then regrows at the next scheduled anagen cycle as a nonaffected, terminal hair.”
- E. P. 1338: “Second, besides the hair shaft, there may be partial injury to the germinative (amplification) zone of the hair follicle.”

...

Table 3. Potential Effects of Light-Pilosebaceous Interactions

Target Effect	Result	Growth Delay	Hair Appearance
Hair shaft	Hair shedding	-	Normal terminal hair
Trichoregulation	Telogen shedding	+	Normal, with anagen regrowth
Partial germinative zonal disruptions	Dystrophic hair regrowth	+/-	Tapered/hypopigmented hair
Total germinative zone ablation	Permanent alopecia	Not applicable	No regrowth

- F. P. 1340: “Patients in this study had the greatest HRE after 1 to 3 treatments. Although further treatments led to some increased hair removal, the added benefit was small.”

15. Robert A. Weiss, MD, et al., *Hair Removal With a Non-coherent Filtered Flashlamp Intense Pulsed Light Source*, 24 *Lasers in Surg. & Med.* 128 (1999)

- A. P. 128: “... two treatments one month apart ...”
- B. P. 129: “At six months following an unusually high number of treatments (13 and 14)”
- C. P. 129: “... flashlamp stimulated non-coherent light filtered to limit wave-lengths from 590 nm to 1,200 nm. Parameters utilized were a 2.8-3.2 millisecond pulse duration for three pulses with thermal realization intervals of 20-30 milliseconds.”
- D. P. 129: “The ripple pulses delivered a total fluence of 40-42- J/cm².”
- E. P. 130: “For the second study, the double treatment protocol, hair clearance of 64% was achieved immediately following the second treatment.”
- F. P. 130: “Side effects are minimal with expected sequel of hair follicle damage seen frequently.”

16. Epilation System, U.S. Patent No. 5,632,741 (filed Jan. 20, 1995) (issued May 27, 1997)

- A. Abstract: “During application of the laser energy, the root structure and the hair, if present, is progressively ablated and vaporized until the bottom of the hair bulb is reached at which time the beam is turned off.”

17. Hair-Removing Device with a Controllable Laser Source, U.S. Patent No. 7,108,690 B1 (filed Apr. 13, 2000) (issued Sept. 19, 2006)

- A. Col. 14: 53-57: “The hair-removing devices described above are epilation devices by means of which hairs are removed from the skin for a comparatively long period or even permanently. A yet further embodiment of a hair-removing device according to the invention operates as a shaver.”
- B. Col. 15: 4-10: “The hair is thus burnt through by the laser beam adjacent the exit position. The control unit of the hair-removing device can be so programmed that the target position lies flush with or even below the surface of the skin, so that a very smooth shaving result is achieved with the hair-removing device, which is maintained for a comparatively long period.”

18. Harvey Jay, MD, et al., *Safety of Intense Pulsed Light Hair Removal in 250 Consecutive New Patients*, 15 *Cosmetic Dermatol.* 15 (Dec. 2002)

- A. P. 15: “... The chart review was inclusive of all patients who had received initial hair removal treatment between July 24, 2001, and September 5, 2002.”
- B. P. 15: ” The interval between treatment sessions for a single individual ranged from 18 to 308 days (mean, 56 days); the most common interval between sessions was 35 days. Patients were usually instructed to return for additional sessions, if needed, at least 3 to 4 weeks after each treatment.”
- C. P. 17: “...hair was shaved to skin level ...”
- D. P. 17: “...treatment settings selected by the treating dermatologist included energy fluence (J/cm^2), low-end out-off filter wavelength, number of pulses, pulse durations, and delay between pulses”
- E. P. 18: “...total of 15 treatment sessions ...”

19. Hair Cutting Apparatus, U.S. Patent No. 5,606,798 (filed Jan. 8, 1993) (issued Mar. 4, 1997)

- A. Abstract: “Hair cutting apparatus including a housing and laser apparatus disposed in the housing and arranged to provide a beam of light impinging on hair to be cut, the beam of light being operative to cut the hair. “
- B. Col. 2: 39-45: “...It is a particular feature of the present invention that suitable selection of the operative wavelength of the laser source enables hair to be

vaporized and carbonized at the location of impingement of the laser beam thereon, thus separating that portion of the hair still attached to the hair follicle from that extending outward from the impingement location, thereby producing a hair cutting effect.”

20. Method and Apparatus for Hair Growth Management, U.S. Patent No. 7,044,959 B2 (filed Mar. 12, 2003) (issued May 16, 2006)

- A. “METHOD AND APPARATUS FOR HAIR GROWTH MANAGEMENT”
- B. Col. 1: 64-67: “A need therefore exists for procedures to manage hair growth for a selected time periods for example several days to a month for facial hair (men’s beard), and several weeks or more (for example, months) for other body areas.”
- C. Col. 2: 48-49: “The method of hair growth management may also involve applying optical radiation to hair follicles in a treatment area of a wavelength, power density and duration sufficient to drive the follicles into a transitional growth arrested state, but not to cause either necrosis of most of each said follicle or immediate gross alteration of any hair shaft therein. The treatment of this method may also be repeated at selected time intervals.”
- D. Col. 4: 7-13: “While some temporary benefits can be obtained from a single treatment employing the parameters of this invention, to achieve desired levels of hair growth management, it is normally necessary to perform multiple treatments at selected time intervals, which intervals may vary from approximately one day to eight weeks, with intervals of one to six weeks generally being preferred.”
- E. Col. 4: 51-55: “Fundamental to this invention is the limiting of destruction/perturbation of the follicle in general, and of the matrix, in particular, and to a lesser extent the papilla, to the extent needed to accomplish the objective of temporary hair growth management.”
- F. Col. 5: 2-5: “Because of this natural cycle, anagen hair follicles can be triggered into a catagen-like state by subtle thermal injury of the matrix and/or adjacent parts of the hair follicle epithelium.”
- G. Col. 5: 32-34: “Regardless of the dominant mechanism, the hair in the follicle sheds after about a week to two weeks or may be easily removed by passing a tape over the hairs“
- H. Col. 6: 38-43: “The invention provides a new way to manage (decrease or suppress) unwanted hair growth. Light assisted hair removal is already described in the prior art. However all the devices and techniques described are designed to significantly damage or destroy the hair follicle with subsequent immediate arrest of hair growth.”

Col. 6: 46-48: "This invention, however provides a new treatment protocol designed not to destroy or significantly damage the hair follicle: ..."

- I. Col. 6: 59-65: "Good cosmetic results generally do not occur immediately, but instead occur either with some delay and/or as a result of multiple treatments with short intervals, generally approximately one day to eight weeks."

Features of the invention include: 1) During the treatment, neither the hair follicle nor the hair shaft therein is destroyed."

- J. Col. 7: 6-10: "Considering each of these features individually:

1) Usually, devices are designed to significantly damage the hair follicle, including the hair shaft itself, such prior art methods and devices generally ablating or melting the hair shaft."

- K. Col. 7: 62-67: "2. Multiple treatments with the intervals between treatment being scheduled or on demand, and either fixed or variable, typical intervals being from approximately one day to eight months with treatments weekly to every three to six weeks being preferred. Other treatment intervals are also within the contemplation of the invention, the required treatment interval varying based on a number of factors including the individual being treated, the number of prior treatments, the prior treatment intervals, ..."

- L. Col. 8: 4-6: "For example, the treatment interval may increase as the number of treatments performed on a patient increases."

- M. Col. 8: 14-16: "... the number of hair shafts may decrease as the number of treatments increases."

- N. Col. 8: 34-38: "Further, during a single treatment session, the radiation-emitting head/device may be applied to or may pass over a given treatment area multiple times, the lack of immediate alteration or damage to the hair shaft or follicle making such multiple passes particularly feasible."

- O. Col. 8: 39-43: "3. The new treatment method could be the only method for management of unwanted hair growth if applied sufficiently frequently (1/week up to 1/2 month depending on body area and patient) or this method could be used in combination with shaving, ..."

- P. Col. 8: 42-44:

"Parameters:

The range of parameter for the treatments of this invention has been determined for the following Tables and Figures."

- Q. "Table 1

Range of power density W/cm^2 for low power Photoepilation”

- R. Col. 13: 54-57: “Head preferably contains the radiation source, for example one or more laser diodes, LEDs, lamps or other suitable optical radiation source.”
- S. Col. 13: 65-67: “Head may move or scan over the surface of skin at a selected rate, with the radiation source being a CW source or suitable pulsed source, or the source may be a pulsed source with head being sequentially moved to selected treatment areas on the skin.”

Col. 14: 29-33: “Where the invention is being operated in pulse mode, a variety of optical dermatology apparatus, either utilizing a coherent/laser source, LED, incoherent/lamp or other suitable optical radiation source, may be utilized.”

- T. Col. 15: 14-19:

“4. A method as claimed in claim 1 including the step of repeating the first and second application steps at selected time intervals.

5. A method as claimed in claim 4 wherein said selected time intervals range is from approximately one day to eight weeks.”

21. B. Finkel, et al, *Pulsed Alexandrite Laser Technology for Noninvasive Hair Removal*, 15 J. Clin. Laser Med. & Surg. 225 (1997)

- A. P. 225: “Treatments were repeated when 1-2 mm growth was observed.”
- B. P. 225 “The average hair count before the second treatment was found to be close to 65% of the pretreatment count. The average hair count 3 months after the last treatment, was found to be lower than 12%. The interval between treatments ranged from 4 weeks to 3½ months.”
- C. P. 225 “This results in the necessity of a few treatments or touchups.”
- D. P. 225 “We have used a 2 msec free running pulsed Alexandrite ($\lambda = 755$ nm) laser operated at a repetition rate of up to 5 ps at energy fluences of 25-40 J/cm^2 ...”
- E. P. 227: “The treatment begins by shaving hair”
- F. P. 227: “The laser technique is effective for removal of hair ranging from fair to dark except when hairs are absent in the shaft, depending on the stage of their growth cycle. The reason for this is that hairs are necessary to serve as dark elongated targets for the Alexandrite laser energy.”
- G. P. 227: “Because treatment is depended on growth-cycle stage, more than one

treatment is always necessary. The required number of treatments for effective hair removal actually depends on the percentage of hairs in the Anagen phase (which varies from site to site on the body), whereas the treatment interval depends on the growth-cycle duration.”

- H. P. 228: “... it is absolutely necessary to avoid fostering expectations of permanency.”

22. D. Manstein, MD et al., *Effects of Fluence and Pulse Duration for Flashlamp Exposure on Hair Follicles*, Presented at 21st Annual Meeting of the American Society for Laser Medicine & Surgery (Apr. 2001)

- A. P. 2: “The optimal values of these parameters have been established.”
- B. P. 2: “The optimal set of parameters has been implemented in a prototype lamp-based photoepilation system (Palomar EsteLux).”
- C. P. 2: “Since 1996, lasers and high-intensity lamps have been successfully used for hair removal. The procedure can be termed more precisely as hair growth management using light. Hair growth management includes several effects: growth delay, changing of hair growing rate, hair miniaturization, changing of hair pigmentation, and permanent hair loss. It was demonstrated that all these effects could be achieved by light. Growth delay is usually close to hair growth cycle ...”
- D. P. 2: “Melanin is the principal target chromophore for hair management with light.”
- E. P. 3: “This goal can be achieved by careful selection of the wavelength spectrum, size of the light beam, and distribution of the light energy over the cross-section of the beam. These parameters are of paramount importance for safe and effective photoepilation.”
- F. P. 9: “Hair shaft damage”
- G. P. 9: “5. – browning of most medium and coarse hair shafts; most of hair shafts demonstrate browning or ablation”
- H. P. 10: “Table 1 Results of *in vitro* study”
- I. P. 15: “The primary objective was to investigate the clinical efficacy of the Palomar EsteLux system as a device for temporary hair growth reduction.”
- J. P. 15: “We found that the threshold for a clinically significant reduction in the growth rate was lower than the threshold we had found in the previous *in vitro* study. Even the lowest fluence tested (4 J/cm²), we observed for some boyd sites

(lower legs) a clinically apparent, although temporary, hair reduction in comparison to non-treated areas.”

K. P. 15: “Results of multiple treatments of one subject are demonstrated in Figure 11”.

L. P. 18: “... demonstrated significant hair growth delay ...”

23. Harvey H. Jay, MD, *A Guide to Laser or Pulsed-Light Removal*, Dr. Jay in the News (Jan. 22, 1999), available at http://www.md-laserderm.com/news_scars.html (last visited Feb. 25, 2014)

A. “Success with EpiLight

I have treated scores of patients for excess hair with EpiLight pulsed light and have observed up to 80 percent hair removal lasting at least six and up to 13 months after a course of two treatments ...”

B. “Use of the term *permanent* is controversial. Permanent to most people means *forever*. This is not the case with hair removal.”

24. Christian Raulin, MD et al., *Effective Treatment of Hypertrichosis with Pulsed Light: A Report of Two Cases*, 39 Ann. Plast. Surg. 169 (Aug. 1997)

A. P. 169: “A treatment attempt with the PhotoDerm VL was carried out (left cheek: 550-nm cutoff; single impulse, 5 msec; fluence, 40 J per square centimeter; right cheek: 570-nm cutoff; double impulse, 5 and 4 msec; fluence, 40 J per square centimeter.”

B. P. 170: “Two days after the treatment, hair could be pulled out easily or fall out automatically. This phenomenon encouraged us to pursue further treatment in 2-week intervals.”

C. P. 171: “During therapy, gradual hair loss could be observed (Fig. 1C). The remaining and regrowing hair became structurally thinner, and the speed of regrowth decelerated and finally stopped. The therapy was ended after 41 treatments with an excellent clinical outcome [Fig 1D].”

25. Sean Lanigan, *Hair Removal by Lasers*, in *Lasers in Dermatology* (2000)

A. P. 83: “...most studies report hair growth delay rather than permanent hair removal.”

- B. P. 84: "One site was treated once and another four times at monthly intervals (Fig. 7.3). After one treatment hair counts were 60% of baseline at 6 months. Three months after four treatments the hair count was 44% of baseline."
- C. P. 85: "The intense pulsed light system of ESC Medical Systems, the Epilight™, has been marketed for hair removal (Fig. 7.5, 7.6)."
- D. P. 86: "Multiple treatment variables are available to the operator, including filter-determined bandwidth, pulse delay, number of pulses and fluence."
- E. P. 87: "Each visible hair should be treated with one or two impacts with the laser. Vaporization of some hairs occurs; others remain loosely attached to the skin but thermally injured. These frequently separate a few days after treatment."
- F. P. 86: "There was a 76.7% removal of hair within six treatments."

26. Method and Apparatus for Hair Removal, U.S. Patent No. 6,080,146 (filed Feb. 24, 1998) (issued June 27, 2000)

- A. Abstract: "A method and apparatus for the removal of, and at least inhibiting the regrowth of, unwanted hair by applying optical radiation to the follicle, including the hair shaft therein, of an energy, a duration and wavelength to enhance the optical absorption characteristics of at least some component (i.e., melanosomes, tissue, etc.) of the follicle without appreciably damaging skin outside the follicle; and subsequently applying optical radiation to the follicle of a wavelength which is more readily absorbed by the components of the follicle having optical absorption characteristics enhanced during step (a) then by unenhanced components and of an energy and duration to heat such enhanced components sufficiently to substantially destroy the follicle."
- B. Abstract: "While a single pulse may be utilized to perform this function, it is preferably performed by a succession of pulses, with each successive pulse darkening additional components of the follicle. For one embodiment, this process is repeated until sufficient components of the follicle have been darkened so that the next pulse results in the substantial destruction of the follicle."
- C. Sheet 4 of 6: "Apply Pulse to Follicle of a wavelength preferentially absorbed by melanin to brown/carbonize melanosomes/tissue"
- D. Col. 2: 33-36: " .. there is a substantial joining of the hair shaft and follicle, the term "follicle" as used hereafter will frequently refer to both the hair shaft and follicle."

27. **Michael H. Gold, MD, et al., *Long-Term Epilation Using the Epi-Light Broad Band, Intense Pulsed Light Hair Removal System*, 23 *Dermatol. Surg.* 909 (1997)**
- A. P. 909: “This manuscript will describe the first clinical trial with the EpiLight in the United States.”
 - B. P. 909: “The purpose of the study is to use the EpiLight Hair Removal System to assess long-term epilation ...”
 - C. P. 910: “A treatment consisted of a sequence of light pulses at a particular cut-off wavelength (determined by the filter). Each pulse sequence had a specific duration (pulse duration) and a specific interval between pulses (pulse delay).”
 - D. P. 913: “Second, will multiple treatment sessions aid the clinician in achieving an even longer period of epilation? Currently, a large multicenter study is underway that may answer this question.”
28. **Michael H. Gold, MD, et al., *One-year Follow-up Using an Intense Pulsed Light Source for Long-Term Hair Removal*, 1 *J. Cutaneous Laser Therapy* 167 (1999)**
- A. P. 167: “RESULTS: Long-term epilation of 75% hair removal was found in this group of patients after 1 year with a single treatment. CONCLUSION: The intense pulsed light source is an effective method for providing long-term epilation of unwanted hair.”
 - B. P. 171: “Most experts in the hair removal arena agree that multiple treatment sessions may yield an even greater percentage of long-term hair removal, and studies need to be performed for all the medical hair removal devices regarding how many treatments are optimal and the appropriate time intervals between treatments.”
29. **M. Douglas Gossman, MD, et al., *Experimental Comparison of Laser and Cryosurgical Cilia Destruction*, 23 *Ophthalmic Surg.* 179 (Mar. 1992)**
- A. P. 179: “In the present study, the argon and carbon dioxide lasers were compared with cryosurgery in terms of the experimental destruction of eyelashes ...”
 - B. P. 180: “The three rows of cilia closest to the eyelid margins were completely ablated. The laser was operated in the pulse mode (0.2 seconds) at 1.5 W, using a 50-micrometer beam size. Follicular destruction was the surgical objective, and the three rows of lashes nearest the lid margin and immediately contiguous tissue were vaporized to a depth of 2.0 mm as measured by a calibrated gauge.”
 - C. P. 182: “Since, as we believe, permanent lash destruction depends on complete

follicle vaporization, vaporization must extend to these structures. Numerous laser bursts (average 12) were required to reach this depth at the power setting, duration, and spot size used in this study.”

30. Valeria B. Campos, MD, et al., *Hair Removal with an 800-nm Pulsed Diode Laser*, 43 J. Am. Acad. Dermatol. 442 (Sept. 2000)

- A. P. 444: “Before treatment, the area to be treated was shaved”
- B. P. 444: “Starting fluences were chosen according to the subject’s skin type.”
- C. P. 444: “Re-treatment was performed when hair started growing back, for up to 4 treatments.”
- D. P. 445: “Absorption of laser light by melanin in the hair shaft, epithelium and matrix cells causes local thermal damage.”
- E. P. 445: “Multiple treatments had an additive effect.” ...
- F. P. 446: “Complete hair removal (100% hair loss) was not seen in any patient. The hair that grew back after diode laser treatment ...”

31. Method of Employing a Flashlamp for Removal of Hair, Veins and Capillaries, U.S. Patent No. 6,080,147 (filed June 10, 1998) (issued June 27, 2000)

- A. Col. 2, 33-40: “U.S. Pat. No. 5,683,380 to Eckhouse discloses a method and apparatus for removing hair (depilation) using a single high intensity pulsed flashlamp ... although it does provide temporary hair loss.”
- B. Col. 2: 44-50: “Accordingly, it is an object of the present invention to provide an improved flashlamp method which supplies a series of short pulses of flashlamp energy with short delays between the pulses from the flashlamp to heat a hair follicle and hair follicle shaft to cause permanent damage to that hair follicle and shaft, ...”
- C. Col. 4: 9: “Fig. 3 is a cross-sectional view of a plurality of hair shafts ...”
- D. Col. 1: 37-38: “The usual chromophore for hair removal flashlamps is melanin ...”
- E. Col. 6: 20-21: “... sufficient flashlamp energy level is required that destroys the hair ...”

32. Multiple Pulse Photo-Epilator, U.S. Patent No. 6,228,074 B1 (filed Oct. 15, 1998) (issued May 8, 2001)

- A. Abstract: "Method and apparatus to cause the cessation of hair growth on a specific area of the body."
- B. Abstract: "The areas is exposed to a particular pattern of multiple wavelength light generated by flashlamps."
- C. Col. 1: 1-3: "This invention relates to a painless method and device for causing temporary and/or permanent cessation of hair growth using flashlamps."
- D. Col. 1: 39-41: "While some treated areas will regenerate some regrowth, additional treatments will alleviate this residual hair growth."
- E. Col. 5: 39-40: "... each treatment will cause cessation of hair growth on the hairs in this phase."
- F. Col. 4:22-24: "...optimum damage is confined to the hair follicle for large and small follicles."

33. Christine Dierickx, MD, et al., *A Clinical Overview of Hair Removal Using Lasers and Light Sources*, 17 Dermatol. Clinics 357 (Apr. 1999)

- A. P. 358: "Melanin in the hair shaft or follicle provides a chromophore that is not present in the surrounding dermis and allows selective targeting of hair in skin. Therefore, at deeply penetrating wavelengths in the 600- to 1100-nm region, melanin absorption may be used for selective photothermolysis of hair follicles ..."
- B. P. 362: "Temporary hair loss (1 to 3 months) always occurs after laser treatments, ..."
- C. P. 362: "This technique successfully induces a delay in hair growth, but fails to produce long-lasting hair removal."
- D. P. 359:

"Table 1. LASERS AND LIGHT SOURCES FOR HAIR REMOVAL"
- E. P. 363: "Ideal treatment parameters must be individualized for each patient and with each device."
- F. P. 363: "Slightly overlapping laser pulses are delivered with a predetermined spot size."

- G. P. 363: “The ideal immediate response to laser treatment is vaporization of the hair shaft with no other apparent effect.”
- H. P. 364: “The ideal treatment interval seems to be as soon as regrowth occurs (I.e., early anagen).”
- I. P. 364: “Expectations and goals vary for every patient: temporary versus permanent and partial versus complete hair removal.”
- J. P. 364: “Blonde, red, or white-haired patients are unlikely to experience a permanent reduction but hair loss in these patients can be maintained by treatment at approximately 3-month intervals.”
- K. P. 364: “Long-term, controlled hair counts indicate an average of 20% hair loss with each treatment indicating the need for multiple treatments to obtain complete hair removal.”

**KEY TO GROUPS OF PRIOR ART REFERENCE CITATIONS BY
SUBJECT MATTER AND LIMITATION**

I	1A, 2A, 2E, 3A, 3F, 3N, 4A, 4C, 5A, 5B, 6B, 6C, 6D, 6H, 6J, 7B, 7F, 7G, 8A, 8B, 8D, 9A, 10B, 10C, 11A, 11C, 12B, 13A, 14A, 15E, 17A, 18A, 18B, 19A, 20A, 20B, 20E, 20H, 20O, 21B, 21H, 22C, 22I, 22J, 23A, 23B, 24C, 25A, 25B, 27A, 27B, 28A, 30E, 31A, 32C, 33B, 33C, 33I
II	1A, 2A, 2E, 3A, 3B, 3F, 3G, 3I, 3N, 4C, 4E, 5A, 5B, 6B, 6C, 6D, 6H, 6J, 7F, 7G, 8A, 8B, 8D, 9A, 10B, 10C, 11A, 11C, 12B, 13A, 14A, 15E, 17A, 18A, 18B, 19A, 20A, 20B, 20E, 20H, 20O, 21B, 21H, 22C, 22I, 22J, 22L, 23A, 23B, 24C, 25A, 25B, 26A, 27A, 27B, 28A, 29A, 30E, 31A, 32A, 32C, 33B, 33C, 33I
III	1E, 2B, 2D, 3C, 3K, 4I, 4K, 5A, 5B, 5E, 5G, 6F, 6G, 7H, 8D, 9A, 13C, 14C, 15C, 15D, 18D, 20C, 20P, 20Q, 21D, 22A, 22B, 22E, 24A, 25C, 25D, 26A, 27C, 29B, 30B, 31A, 32B, 33D
IV	1B, 2F, 3E, 3J, 4D, 5D, 5J, 6A, 6E, 6F, 7A, 7C, 7D, 7E, 12A, 20Q, 20R, 20S, 22D, 26A, 26C, 31D, 33A, 33E
V	1C, 1D, 2A, 2C, 2G, 3D, 3K, 3P, 4F, 5B, 5H, 6I, 7I, 7J, 7L, 7M, 8C, 10A, 14D, 16A, 17B, 18C, 19B, 20C, 20G, 20J, 21E, 21F, 22F, 22G, 22H, 25E, 26A, 26B, 26C, 26D, 29B, 30A, 30D, 31B, 31C, 31E, 33G
VI	1F, 1G, 1H, 3H, 3J, 3M, 3N, 3O, 4B, 4G, 4H, 4I, 4J, 5A, 5C, 5F, 5I, 6B, 6C, 6D, 6H, 6J, 7N, 8E, 9A, 9B, 9C, 9D, 9E, 10D, 11B, 12C, 13B, 14A, 14B, 14F, 15A, 15B, 18B, 18E, 20D, 20I, 20K, 20L, 20N, 20O, 20T, 21A, 21B, 21G, 22K, 24B, 25F, 26A, 26B, 26C, 27D, 28B, 29B, 29C, 30C, 31B, 32D, 32E, 33F, 33H, 33J, 33K
VII	1F, 3H, 3J, 3M, 3N, 3O, 4B, 4G, 4H, 4I, 4J, 5F, 5I, 6B, 7K, 7N, 8E, 9A, 9B, 9C, 9D, 9E, 10D, 11B, 12C, 13B, 14B, 14F, 18B, 18E, 20I, 20K, 20L, 20M, 21A, 21B, 21C, 21G, 22K, 24B, 25F, 28B, 30E, 31B, 32E, 33H, 33K
VIII	1I, 2G, 3Q, 4D, 5E, 7B, 7O, 13B, 14E, 15F, 20E, 20F, 20H, 26A, 26B, 26C, 26D, 29B, 29C, 31B, 32F, 33A